A carbohydrate pulse experiment to demonstrate the sugar metabolism by *S. mutans*

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Streptococcus mutans is a fast growing organism, of low cost and easily prepared culture medium. It has been related primarily to an elevated risk of dental cavity development in the host due to the acid-induced tooth demineralization. To prevent this disease, addition of fluoride can be required, promoting the mouth hygiene. The main objective of this experiment is to show the influence of the carbon source and fluoride on the acidogenic capacity of *S. mutans*. The strain was cultivated in microaerophilia, at 37°C for 12 hours in complete medium (stationary phase). The cells were harvested by centrifugation at room temperature, washed with saline solution and suspended in the same solution. The absorbance was adjusted to 1 and the pH to 7.3 using 0,1 mol/L KOH solution. To 10 mL of the cell suspension, distinct carbohydrates (glucose, xilose, sucrose, fructose or maltose) were added, enough to establish a 50 mMol/L final concentration. Fluoride was added (1 mmol/L final concentration) and the pH was monitored during 2 hours. In this incubation period, the suspension was kept at room temperature with slow stirring and the pH was monitored each 7 minutes. In the 20 initial minutes of incubation with glucose, fructose, maltose and sucrose, an intense and very similar pH decrease ($\cong 2.5$ units) can be observed. This acidification reflects both the sugar uptake and anaerobic metabolism. After this initial acid liberation, a phase of slow pH decrease is observed, continuing up to 120 minutes of incubation. In presence of xilose, the acidification is less intense and reaches a similar value to that of the control without carbohydrate addition (decreasing $\cong 1.4$ units of pH). The initial acidification in the presence of xilose may occur due to the mechanism of sugar uptake by this organism, which involves the antiport with H⁺. In media without the addition of carbohydrate, the acidification may be due to the metabolism of intracellular reserves of sugars. Fluoride affects negatively the acidogenic capacity of *S. mutans* for all metabolized sugars.